

REMARKS

Claims 1-26 remain in the present application. Applicant respectfully requests further examination and reconsideration of the rejections based on the arguments set forth below.

Claim Rejections – 35 U.S.C. §103

Claims 1-2, 5-10, 12 and 17-24

Claims 1-2, 5-10, 12 and 17-24 are rejected under 35 U.S.C. §103(a) as being unpatentable over United States Patent Number 5,742,142 to Witt (hereafter referred to as "Witt") in view of United States Patent Number 6,774,587 to Makaran et al. (hereafter referred to as "Makaran"). Applicant has reviewed the cited references and respectfully submits that the embodiments of the present invention as recited in Claims 1-2, 5-10, 12 and 17-24 are not rendered obvious by Witt in view of Makaran for the following reasons.

Applicant respectfully directs the Examiner to independent Claim 1 that recites a fan speed controller comprising (emphasis added):

a pulse width modulation generator for generating a pulse width modulation signal, wherein an operating frequency of said pulse width modulation generator is approximately within the range of 200-1,000 KHz; and

a drive stage circuit coupled to said pulse width modulation generator and for switch mode converting a supply voltage into a linear voltage for driving a fan, wherein a voltage level of said linear voltage is a function of said pulse width modulation signal.

Independent Claims 8 and 23 recite limitations similar to independent Claim 1.

Claims 2, 5-7, 9-10, 12, 17-22 and 24 depend from their respective independent Claims and recite further limitations to the claimed invention.

Applicant respectfully submits that Witt and Makaran, either alone or in combination, fail to teach or suggest the limitations of "said capacitor has an ESR value determined as a function of said first and second potentials" as recited in Claims 6 and 21. Specifically, Applicant fails to find any teaching or suggestion in either reference of *an ESR value of a capacitor* as claimed. Further, Applicant fails to find any teaching or suggestion in either reference of an ESR value of a capacitor *determined as a function of said first and second potentials* as claimed.

Applicant respectfully submits that Witt and Makaran, either alone or in combination, fail to teach or suggest the limitations of "a second transistor having a... source coupled to said drain of said first transistor and to said second terminal of said inductor" as recited in independent Claim 10. Specifically, Applicant fails to find any teaching or suggestion in either reference of *a first transistor coupled to a second transistor* as claimed. Further, Applicant fails to find any teaching or suggestion in either reference of two transistors *further coupled to an inductor* as claimed.

Additionally, Applicant respectfully submits that no suggestion or motivation to combine Witt and Makaran in the claimed fashion has been shown sufficiently to establish a prima facie case of obviousness, as discussed in MPEP §2143. Applicant respectfully submits that neither Witt nor Makaran, either explicitly or inherently, provide a motivation or suggestion to combine the two references in the claimed fashion. Moreover, the references both explicitly teach away from the combination.

For example, Witt is directed to “control of DC motors by PWM controls which... meet radiated emission requirements” (col. 1, lines 57-59), where Witt teaches that high-frequency PWM waveforms will “produce radiated electromagnetic emissions which greatly exceed the specifications of automotive manufacturers” (col. 1, lines 38-41). As such, Witt teaches the generation of a PWM signal in the range of 20-100 kHz for controlling the speed of a fan (col. 3, lines 8-10).

In contrast, although Makaran teaches that a high frequency PWM signal may be used in certain applications, Makaran explicitly recognizes that higher-frequency PWM signals are *not suitable* for applications requiring lower EMI. Makaran teaches that the use of high-frequency PWM signals produces “significant electromagnetic radiation issues that must be mitigated” (col. 4, lines 52-54). Makaran further advises that PWM signals with a frequency less than 1 kHz, and preferably less than 500 Hz, should be used to produce less high frequency EMI (col. 4, lines 48-51).

Accordingly, although page 3 of the rejection suggests that the use of a higher frequency PWM signal, for example as taught by Makaran, with the motor of Witt would eliminate and/or reduce EMI issues, Applicant respectfully disagrees and reiterates that both Witt *and* Makaran make clear that the use of higher frequency PWM signals will *increase* EMI as discussed above. As such, the use of a higher frequency PWM signal with the motor of Witt would produce unacceptable EMI outside of the radiated emission requirements taught by Witt, thereby rendering the invention of Witt inoperable. Further, Makaran’s teaching that the PWM signal frequency should be kept below 500 Hz for acceptable EMI emissions directly teaches away from increasing the PWM signal frequency fed

to Witt's motor beyond the 100 kHz maximum taught by Witt. In other words, Makaran thereby teaches away from increasing the PWM signal frequency by *greater than 20,000%* (e.g., to exceed the 100 kHz limit taught by Witt) of the preferred value of 500 Hz taught by Makaran. Consequently, Applicant respectfully submits that one skilled in the art would not be motivated to combine Witt and Makaran in the claimed fashion.

Further, pages 7 and 8 of the rejection invite Applicant to cite a "specific advantage to having it exactly within the range claimed." However, Applicant respectfully submits that this is not required to overcome a *prima facie* case of obviousness based on overlapping ranges. Instead, MPEP §2144.05 states that "[a] *prima facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention." Applicant respectfully submits that the following portion of Makaran teaches away from using a PWM signal between the claimed range of approximately 200 Hz to 1000 kHz and instead toward much lower frequencies:

While the frequency of the PWM signal may suitably be a high frequency, such as on the order of 10 kHz to 500 kHz, it has been found that the use of lower frequency signals, such as on the order of less than 1000 Hz, and preferably between 20 and 500 Hz have the advantage of producing less high frequency electromagnetic interference. In particular, when the PWM signal frequency is high, the switch 24 switches at the high frequency, and can create significant electromagnetic radiation issues that must be mitigated. Accordingly, in a preferred embodiment of the present invention, the PWM signal frequency is chosen to be less than 1000 Hz, and preferably between 20 and 500 Hz.

As such, Applicant respectfully submits that any *prima facie* case of obviousness that may have been shown has been rebutted, thereby overcoming the 35 U.S.C. §103(a) rejections of record.

For these reasons, Applicant respectfully submits that independent Claim 1 is not rendered obvious by Witt in view of Makaran, thereby overcoming the 35

U.S.C. §103(a) rejections of record. Since independent Claims 8 and 23 recite limitations similar to those discussed above with respect to independent Claim 1, independent Claims 8 and 23 also overcome the 35 U.S.C. §103(a) rejections of record. Since Claims 2, 5-7, 9-10, 12, 17-22 and 24 depend from and recite further limitations to the invention claimed in their respective independent Claims, Claims 2, 5-7, 9-10, 12, 17-22 and 24 also overcome the 35 U.S.C. §103(a) rejections of record. Therefore, Claims 1-2, 5-10, 12 and 17-24 are allowable.

Claims 3-4, 11, 13-16 and 25-26

Claims 3-4, 11, 13-16 and 25-26 are rejected under 35 U.S.C. §103(a) as being unpatentable over Witt in view of Makaran and further in view of United States Patent Number 6,801,004 to Frankel et al. (hereafter referred to as "Frankel"). Applicant has reviewed the cited references and respectfully submits that the embodiments of the present invention as recited in Claims 3-4, 11, 13-16 and 25-26 are not rendered obvious by Witt in view of Makaran and further in view of Frankel given that Claims 3-4, 11, 13-16 and 25-26 depend from and recite further limitations to the invention claimed in their respective allowable independent Claims.

CONCLUSION

Applicant respectfully submits that Claims 1-26 are in condition for allowance and Applicant earnestly solicits such action from the Examiner.

The Examiner is urged to contact Applicant's undersigned representative if the Examiner believes such action would expedite resolution of the present application.

Please charge any additional fees or apply any credits to our PTO deposit account number: 50-4160.

Respectfully submitted,

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